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NASA's S'COOL Program

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STEM Earth Central 2007

NASA's S'COOL Program (Students' Cloud Observations On-Line)

NASA's S'COOL program gives students an opportunity to provide "ground truth" measurements to help NASA verify that data collected by CERES (Clouds and the Earth's Radiant Energy System) instruments. The CERES instrumentation has been launched into polar orbits on three satellites.

The CERES instrumentation is attempting to detect clouds against a highly variable background on Earth's surface. Students make cloud observations at the exact time that a satellite is passing overhead. Those observations are then submitted to NASA which then uses the data to calibrate the satellite's data. This gives students an opportunity to participate in authentic scientific research.

You can visit the S'COOL web site at <http://asd-www.larc.nasa.gov/SCOOL/> to become familiar with the features of the S'COOL program.

Once you enroll your school, you would also have access to the programs data base that includes times that the AQUA and TERRA satellites pass over your location. This requires that you submit the Latitude and Longitude of your school's location.

The following data table indicates the "Overpass" schedule for the AQUA and TERRA satellites for Amherst during the first week of this summer's Earth Central Institute.

Date	TERRA Overpass Time	AQUA Overpass Time
August 6th	10:55	14:14
August 6th	12:23	
August 7th	11:38	13:19
August 7th		14:57
August 8th	12:21	14:02
August 9th	11:26	13:07
August 9th		14:45

Working Toward Authentic Ground Truth Observations

An emphasis on the need for authentic observations is important. A S'COOL Cloud Identification Chart is provided for identifying cloud types and cloud levels (high, mid, or low) during an observation of clouds. Many students will benefit from viewing images available many web sites on the Internet.

Students should practice making cloud observations several times before the making observations that will be submitted to NASA. Having students work cooperatively in small groups as they make observations and then having each team present their observations can reveal the extent to which there is agreement on the types, extent, and levels of cloud cover.

Once students have develop effective could observation skills, the class submits one set of observations of to NASA using either the preferred on-line form or a hard copy form than can be mailed to NASA.

Earth Central Cloud Observations

Times when you are conducting trials for the Solar Design Challenge will also provide opportunities to practice making cloud observations.

STEM Connections

The S'COOL brochure that lists a number of opportunities to integrate the S'COOL program into middle school and high school STEM programs many of which relate closely to Earth Central activities.

Cloud "Machines"

The reverse side of the Cloud Identification Chart provides a description of a method for observing the formation of a cloud in a jar when condensation nuclei are provided and humid air is cooled. This is an excellent model of the formation of advection fog. A plastic beverage container can also be used to demonstrate the formation of a cloud as adiabatic cooling occurs when unstable, humid air expands as it rises in the atmosphere.